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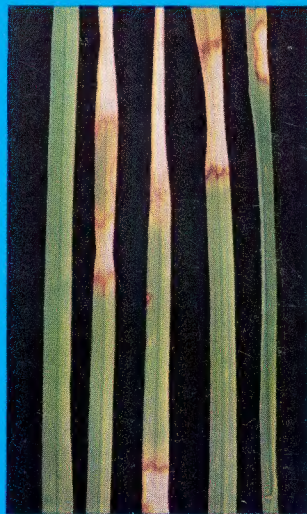
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# LAWN DISEASES

*How  
to  
control  
them*



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U. S. DEPARTMENT OF AGRICULTURE

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## PRECAUTIONS

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in the original containers—out of reach of children and pets—away from foodstuff.

Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. Avoid prolonged inhalation of a pesticide spray or dust. When applying a pesticide it is advisable that you be fully clothed.

After handling a pesticide, do not eat, drink, or smoke until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Dispose of empty pesticide containers by wrapping them in several layers of newspaper and placing them in your trash can.

It is difficult to remove all traces of a herbicide (weed killer) from equipment. Therefore, to prevent injury to desirable plants do not use the same equipment for insecticides and fungicides that you use for a herbicide.



*Use Pesticides Safely*  
FOLLOW THE LABEL

U.S. DEPARTMENT OF AGRICULTURE

# LAWN DISEASES

## How to control them

By K. W. KREITLOW and F. V. JUSKA,

*Plant Science Research Division, Agricultural Research Service*

Most of the grasses in lawns grow under artificial conditions and are more subject to attack by disease organisms than they would be in a natural environment. Healthy, vigorously growing, adapted lawn grasses that are properly managed can best survive disease attacks.

The homeowner's best defense against lawn diseases is to follow these basic principles of lawn establishment and maintenance:

- Select grasses adapted to the soil, climatic, and light conditions under which they will be grown.
- Spend the necessary time, effort, and money on caring for the lawn. In addition to disease control, lawn care includes proper fertilizing, watering, mowing, and insect and weed control.

For information on establishment and maintenance of lawns,

see your county agricultural agent or State extension service specialist, or write to the U.S. Department of Agriculture, Washington, D.C. 20250.

Proper care does not completely prevent or cure diseases, but it helps to curb them so that chemical controls can be more effective if they become necessary.

Knowing how to diagnose the most common causes of dead or injured grass and knowing the recommended treatments for various unhealthy conditions will help the homeowner to prevent serious lawn damage. Poor turf may be due to disease or to any one or a combination of other causes—undesirable or unadapted species, insect damage, fertilizer and chemical burning, dog urine, improper mowing, improper watering, localized dry spots, and compacted soil.



# FUNGUS DISEASES

Fungi cause most of the serious and widespread diseases of lawn grasses. All the diseases discussed in this bulletin are fungus diseases. Most of the fungi that attack lawn grasses occur in the form of microscopically small filaments, or threads. The mass of threads, which sometimes have a cobwebby appearance, are called mycelium. Many fungi reproduce by means of microscopic fruiting structures called spores.

Only those fungi that get their nutrients from a living host are true disease organisms. Such organisms cause *Helminthosporium* leafspot, fading-out, brown patch, rust, grease spot, dollar spot, stripe smut, and snow mold.

Mushrooms and slime molds in lawns are examples of fungi that are not true disease organisms. They do not attack lawn grasses directly, but are discussed with disease organisms because they are a common lawn problem.

## HELMINTHOSPORIUM LEAFSPOT AND FOOT ROT

This disease, which gets its name from the *Helminthosporium* fungi that cause it, is one of the most widely distributed and destructive grass diseases. Kentucky bluegrass is one of the species most severely damaged.

The principal fungus causing leafspot in Kentucky bluegrass also causes a foot rot condition known as going-out or melting-out. The disease occurs mainly during cool, moist weather of spring and fall, but it may develop throughout the summer. Pure stands of Kentucky bluegrass favor development of the disease; mixtures of several recommended species usually retard development because most

mixtures contain naturally resistant species.

### Symptoms

Damage is most conspicuous in the leaves. However, the fungus responsible for the disease also causes a sheath rot or foot rot. The fungus produces reddish-brown to purplish-black spots on leaves and stems of Kentucky bluegrass. Leaves shrivel and the stems, crowns, rhizomes, and roots discolor and rot. Leafspots and foot rots produced on other grasses by different species of *Helminthosporium* resemble those on Kentucky bluegrass. Dead grass in attacked areas often is attributed to drought injury. Weeds and crabgrass usually invade these areas.

### Control

In Kentucky bluegrass lawns, you can control the disease by growing less susceptible varieties such as Fylking, Merion, Pennstar, and Windsor. Some leafspotting may occur, but these varieties are more resistant than ordinary Kentucky bluegrass and are seldom killed during the destructive foot rot stage.

Follow these management practices to reduce damage: Mow upright-grow-



*Helminthosporium* leafspot caused damage at left in this plot of common Kentucky bluegrass.



Lesions on the five leaves of Kentucky bluegrass at the right were caused by a *Helminthosporium* leafspot fungus. Healthy leaf is at left.

ing grasses to a height of  $1\frac{3}{4}$  to 2 inches rather than  $\frac{1}{2}$  to 1 inch. Apply enough fertilizer to keep grass healthy and thriving. Avoid overstimulation with nitrogen, particularly in the spring. Remove clippings, especially on lawns receiving heavy fertilization.

Fungicides that control *Helminthosporium* leafspot are listed on pages 12-13.

## FADING-OUT

Fading-out is caused by a complex of *Helminthosporium* and *Curvularia* species of fungi that attack bentgrasses, fescues, and Kentucky bluegrass. It occurs in all parts of the country.

The disease is most destructive during hot, humid weather from May to October. Diseased areas appear yellowed or dappled green as though the grass were suffering from iron deficiency or low fertility. When the disease becomes severe and uncontrolled, the grass "fades out," leaving dead grass in irregular reddish-brown patches 2 to 3 inches in diameter.

Sometimes these spots merge to form dead areas a foot or more in diameter.

The same management practices and fungicides recommended for controlling *Helminthosporium* leafspot are recommended for controlling fading-out.

## BROWN PATCH

The fungus responsible for brown patch attacks practically all species of grasses, but it is most serious on bentgrasses, fescues, Kentucky bluegrass, ryegrass, centipedegrass, and St. Augustinegrass. Brown patch is one of the most prevalent lawn grass diseases in the warm, humid regions of the United States. It occurs during warm, wet weather. Brown patch is most damaging following excessive applications of nitrogen fertilizer. This promotes a lush growth of grass that is readily attacked. The disease spreads by fungus threads, or mycelium. New infections can start from mycelium carried on shoes, mowing equipment, or grass clippings.

### Symptoms

Brown patch is characterized by development of irregular circular areas a few inches to several feet in diameter with a brownish discoloration. In



Brown patch fungus caused this injury in Kentucky bluegrass.



## RUST

bentgrasses a narrow, dark, smoke-colored ring borders the diseased area. This disappears when the weather becomes cool or dry. Sometimes only the leaves are affected and the turf recovers in 2 or 3 weeks. However, if the disease is severe and weather conditions remain favorable for its development, it attacks the crowns and kills the grass. The dead grass generally remains erect and does not lie flat like grass killed by grease spot, a *Pythium* disease. The fungus threads, or mycelium, are frequently observed as filmy, white tufts early in the morning while the grass is still wet with dew. As the leaves dry, the fungus threads shrivel and disappear, and only dead and dying leaves are left. After several weeks, new grass grows back into the affected area.

### Control

Management practices that help in control: Avoid excessive applications of nitrogen fertilizer. Water lawns early in the day to give grass leaves time to dry out before night. Remove clippings if excessive.

Brown patch can be controlled if the lawn is watered 48 hours before treating with a fungicide and if this is repeated three times at weekly intervals.



Rust fungi attack many lawn grasses. Rust usually occurs in late summer and remains until frost. Heavy dew favors its development.

Rust damage is more severe on Merion Kentucky bluegrass and zoysia than on other grasses. Meyer and Emerald zoysias are susceptible to rust infection.

Rust has appeared on Merion Kentucky bluegrass from Rhode Island to California and from Canada to Oklahoma. The rust fungus seems to attack Merion wherever it is grown.

Some Kentucky bluegrass varieties resist rust infection entirely. Common Kentucky bluegrass is less susceptible to rust than Merion. However, it is vulnerable to the more destructive *Helminthosporium* leafspot.

### Symptoms

Symptoms are yellow-orange or red-brown powdery pustules that develop on leaves and stems. If a cloth is rubbed across affected leaves, the rust-colored spores adhere to the cloth and produce a yellowish or orange stain.

### Control

Lawns containing pure stands of Merion Kentucky bluegrass are especially susceptible to attack by rust fungi. Damage is less severe if Merion Kentucky bluegrass is mixed with common Kentucky bluegrass or with red fescue. Recommended mixtures are 50-percent Merion and 50-percent common Kentucky bluegrass; 50-percent Merion Kentucky bluegrass and 50-percent red fescue; or 50-percent Merion, 25-percent common Kentucky bluegrass, and 25-percent red fescue. The Kentucky bluegrass varieties, Fylking and Pennstar, are more rust-resistant than Merion.

Mowing, fertilizing, and watering





A rust fungus attacked the three Merion Kentucky bluegrass leaves at left. Healthy leaf is at right.

practices recommended in the summary of management practices (page 14) will help to control rust.

Several chemicals (see pp. 12-13) control rust on Merion Kentucky bluegrass and other grasses. Chemicals do not completely eradicate rust or prevent infection of growth that comes out after treatment. Repeated applications may be necessary to keep rust under control, especially on Merion Kentucky bluegrass. Actidione-thiram<sup>1</sup> and zineb give good control but tend to injure Merion temporarily and retard growth for about 7 days. Normal growth follows this temporary condition.

## PYTHIUM DISEASES

The two most destructive lawn diseases caused by *Pythium* fungi are grease spot and cottony blight. Grease

spot occurs in many parts of the country on a wide range of grasses; cottony blight occurs mainly on ryegrass in the South.

*Pythium* diseases occur in humid areas and may be more widespread than is generally realized. The fungi are destructive at 70° F, and above, especially in poorly drained soils. These diseases are most common on newly established turf, but if conditions are favorable they occur on grass regardless of age.

## Symptoms

Diseased areas vary from a few inches to several feet in diameter and they sometimes occur in streaks as though the fungus had spread from mowing or from water flow following heavy rains. Injury is most noticeable in early morning as a circular spot or group of spots about 2 inches in



Mycelium of the *Pythium* fungus that causes cottony blight. This is an early stage of an infection in ryegrass.

<sup>1</sup> Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture, and does not imply its approval to the exclusion of other products that may also be suitable.

diameter surrounded by blackened grass blades that are intertwined with the fungus threads. Diseased leaves become water soaked, mat together, and appear slimy. The darkened grass blades soon wither and become reddish brown, particularly if the weather is sunny and windy. Grass is usually killed in 24 hours and it lies flat on the ground rather than remaining upright like grass affected by the brown patch disease. New grass does not grow back into the diseased area.

### Control

The most important management recommendation is to avoid watering methods that keep foliage and ground wet for long periods. Other suggestions: Avoid excessive watering during warm weather. Delay seeding until fall because cool, dry weather generally checks the disease.

Chemicals give best results if used when the disease first appears (see pp. 12-13).

## DOLLAR SPOT

Dollar spot, also known as small brown patch, occurs on many species of grasses. The disease is particularly destructive in bentgrasses. It is most



Spots in bermudagrass caused by the dollar spot fungus.



Dollar spot fungus caused the lesions on the four Kentucky bluegrass leaves at right. Healthy leaf is at left.

prevalent in the humid northern areas of the United States but occurs also in States farther south.

The fungus is most destructive during cool, wet weather. It generally attacks in May and June, stops during July and August, and starts again in September and October. Dollar spot may occur in any turf regardless of management or soil fertility, but damage usually is greatest if there is a deficiency of nitrogen.

### Symptoms

The disease is characterized by development of bleached spots the size of a silver dollar. Affected grass is killed, and the turf is left pitted. Sometimes the diseased areas merge and form large, irregular patches. At first, spots of diseased grass are dark and somewhat water soaked; then they turn brown and ultimately bleach nearly white. If the fungus is growing actively, a fine, white, cobwebby mycelium can be seen when dew is still on the grass. Sometimes only the uppermost grass blades are affected and



light-colored blotches develop on them.

Turf recovers quickly if treated with fungicides in the early stages of a disease attack; if left untreated it may take many weeks for new grass to fill in dead areas.

The best control is to use chemicals listed on pages 12-13.

## STRIPE SMUT

Stripe smut fungus attacks several lawn grasses but it is most prevalent and destructive on Merion Kentucky bluegrass, principally in the northern half of the United States.

Smut spores in contaminated soil germinate and produce infection threads that invade grass seedlings and young tillers. Since the fungus grows systemically, infected plants remain diseased until they die.

### Symptoms

Narrow gray or black stripes that may be continuous or discontinuous develop lengthwise in leaf blades. The



Stripe smut fungus caused the linear dark streaks in the three Kentucky bluegrass leaves at left. Healthy leaf is at right.



Leaves of a Kentucky bluegrass plant curled and shredded by stripe smut infection.

gray stripes are unruptured smut sites called sori. The black streaks result when smut sori rupture and liberate a mass of black, powdery spores. Following rupture of the sori, diseased leaves wither, curl, and shred from the tip downward, and die.

Diseased Kentucky bluegrass plants occur singly, or in spots from a few inches to a foot or more in diameter. Infected plants are often pale green to slightly yellowed. They also are shorter than neighboring healthy plants and may be obscured by them.

Stripe smut is most readily seen on leaves during cool weather in spring and fall. Diseased plants are difficult to find during hot, dry weather because many infected plants die. Smutted plants also are difficult to find shortly after mowing due to their slower growth.

### Control

No fungicides are presently suitable for treating the disease. Smut damage



is less severe if Merion Kentucky bluegrass is mixed with common Kentucky bluegrass, or if smut-tolerant varieties like Fylking, Park, or Pennstar are grown.

## SNOW MOLD AND FUSARIUM PATCH

These diseases are especially severe on bentgrasses, but they also occur on other lawn grasses. Snow mold, or winter scald, is caused by several different fungi. It is most severe when snow covers grass for long periods. It is particularly difficult to control if the grass is green and growing actively when covered by lasting snow. Fusarium patch, also known as pink snow mold, can occur during the growing season when humidity is high and daily temperatures fall below 65° F. Any condition that keeps the turf excessively wet, such as poor surface drainage, favors these diseases.

### Symptoms

Snow mold symptoms appear first as a white cottony growth on the leaves. As the leaves die they turn light brown and cling together. Diseased areas are usually 1 to 12 inches or more in diameter and discolored dirty white, gray, or slightly pink. Fusarium patch is characterized by development of irregular pale yellow areas from several inches to several feet in diameter. Later, affected areas become whitish gray. Sometimes the edge of an affected area has a faint pinkish color.

### Control

Proper management in the fall is especially important because the condition of the turf as it goes into the winter determines whether the snow mold fungus can easily get established. Do not apply high nitrogen fertilizers late in the fall because that might stimulate growth and result in an actively

growing turf when snow covers the ground. Keep the lawn cut in the fall to prevent a mat of grass from developing. Apply lime if soil tests indicate a need for it.

Apply Dyrene before the first lasting snow to give the best results. Additional treatments may be necessary if the snow melts in midwinter or early spring. Dyrene doesn't prevent snow mold and fusarium patch but helps to reduce their severity.

## MUSHROOMS AND FAIRY RINGS

Many kinds of mushrooms grow in lawns and turf areas. They vary in size, shape, and habit of growth, and in the way they affect the turf. They may grow individually or in clumps. Some grow in a circle and cause a condition known as fairy rings.

### Mushrooms

Mushrooms that grow individually or in clumps usually develop from buried organic matter such as pieces of construction lumber, logs, or tree stumps. Mushrooms with this growth habit are usually harmless to grasses but are objectionable because they



Mushroom fruiting bodies emerging in lawn grass.



**A large fairy ring with stimulated grass and fruiting bodies (mushrooms) of the fungus growing at the outer edge.**

are unsightly and the fruiting bodies occur repeatedly. They develop following prolonged wet weather, and often disappear as soon as the soil begins to dry or when the grass is mowed.

Eliminate mushrooms that grow from buried lumber, logs, or stumps by digging up the pieces of buried wood. If this is impractical, drench the soil with captan. The simplest way to drench is to punch holes 6 to 8 inches apart and 6 to 8 inches deep in the ground within and surrounding the infected area. Use an iron rod or pipe for punching the holes, then pour a solution of captan down the holes.

### **Fairy Rings**

Fairy rings are circles, or arcs, of dark-green grass surrounding areas of light-colored or dead grass. During spring and fall the fruiting bodies (mushrooms) develop in a circle outlining the fairy ring. Unless the fungus is controlled the ring enlarges each year and leaves alternate bands of green and discolored grass.

The fungus that causes fairy rings begins growth at a particular point and continues to grow outward. It may spread from 5 to 24 inches annually; the rate of spread depends on soil conditions, temperature, moisture, and

fertility. The fungus is usually several inches below the ground and it forms a dense layer of mycelial threads that break down organic matter at the outer edge of the ring. Grass at the outer edge grows faster than grass outside the ring, and is darker green. Dying or dead grass is inside the zone of stimulated growth. Fairy rings seldom occur in lawns that are adequately fertilized and treated with fungicides for control of other diseases.

For best control, fumigate the affected area. As an alternate method, punch holes around the outside of the ring and throughout the affected area, then pour a solution of captan into the holes.

### **SLIME MOLDS**

A group of fungi known as slime molds often covers grass with a dusty, bluish-gray, black, or yellow mass. Slime molds are not parasitic on grass, but they are unsightly. They feed on dead organic matter. The most damage they do to grass plants is to shade and discolor the blades. Slime molds occur during wet weather; they disappear rapidly as soon as it becomes dry. The



**Slime mold fungus clings to the three Kentucky bluegrass leaves at left. Clean leaf is at right.**

large masses can be readily broken up by sweeping with a broom or by spraying with a strong stream of water. During prolonged damp weather slime

molds can be especially annoying and it may be desirable to apply any good garden or turf fungicide to affected areas.

## OTHER CAUSES OF POOR TURF

### UNDESIRABLE SPECIES

Short-lived perennials like redtop and ryegrass or weedy annuals such as annual bluegrass and crabgrass do not make a desirable lawn. Annual species usually die at the end of the growing season, and leave brown or bare areas that may be mistaken for disease injury.

### UNDESIRABLE MIXTURES

Bermudagrasses and zoysiagrasses turn straw colored or brown following a killing frost. When these species are grown in a sod composed mainly of cool-season grasses, a mottled brown and green lawn often results because of the differences in sensitivity to cold. This effect may resemble disease injury.

### INSECT INJURY

Lawn grasses are often damaged by insect pests. For information concerning lawn insects and their control, see your county agent or write to the U.S. Department of Agriculture, Washington, D.C. 20250.

### FERTILIZER BURN

Concentrated inorganic fertilizers, if applied too heavily, burn grass in 2 or 3 days. Burned areas may occur in spots or streaks or the entire lawn may be damaged. To prevent injury, apply the fertilizer evenly in recommended amounts when the grass is dry, then water immediately. If burning occurs, water generously to wash off excess fertilizer and reduce injury.

### HYDRATED LIME BURN

Hydrated lime burns grass if it is applied unevenly and in large amounts. Ground agricultural limestone is safer and is usually recommended for lawns.

### PESTICIDE INJURY

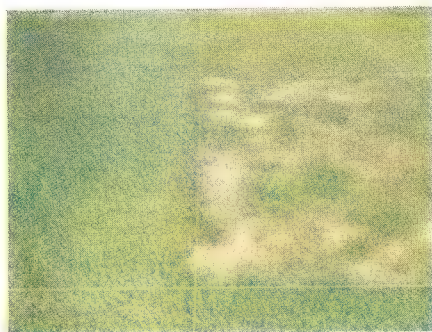
Some of the chemicals used for disease, insect, and weed control are potent and may injure grass if improperly applied. Chemical formulations vary with manufacturers. Follow directions and observe all precautions on the label.

### DOG URINE INJURY

This kind of injury is frequently mistaken for disease damage. Affected spots are usually round or slightly irregular and variable in size. The grass within the spot turns brown or straw colored and usually dies.

### IMPROPER MOWING

Cutting grass too closely or too frequently may result in a condition that



Fertilizer burn caused yellowing in grass at right.



looks like disease. Cut Kentucky bluegrass, red fescue, and other grasses with upright growth habit to a height of  $1\frac{3}{4}$  to 2 inches. Do not lower the height of cutting in midseason; it may result in serious injury. Mow the grass before it gets too tall; not more than one-half of the leaf surface should be removed at one time. The frequency of mowing will depend on quantity of fertilizer and water applied, weather conditions, and other factors that influence plant growth. Clippings need not be removed unless growth is excessive.

### IMPROPER WATERING

Frequent light watering induces shallow rooting in grasses. Shallow-rooted grasses are readily injured during periods of severe drought. Frequent evening watering favors disease development because it keeps grass leaves moist for long periods.

Do not water grass until it begins to wilt, then apply enough water to soak the soil to a depth of 6 inches or more. It is more economical to water the lawn only when water is needed and it is better for the grass.

### BURIED DEBRIS

A thin layer of soil over rocks or debris such as lumber, stumps, plaster, and cement dries rapidly and may not retain enough moisture to keep grass green. Correct this condition by removing the cause.

### ACCUMULATION OF RUNNERS

Another type of dry spot results when an accumulation of runners (thatch) in bermudagrass, bentgrass, and zoysiagrass becomes impervious and does not let water into the soil. Mowing following vigorous hand raking corrects this condition.



### COMPACTED SOILS

Saturated soils pack easily and bake hard when dry, especially where traffic is heavy. The soil may become packed so hard that water will not penetrate the surface. Grass then thins out and bare spots result. To correct this condition, loosen or perforate the soil with a tined fork or aerifying implement and, if necessary, fertilize and reseed the lawn.

### COMPONENTS OF RECOMMENDED FUNGICIDES<sup>1</sup>

Acti-dione-thiram: (\*) cycloheximide plus tetramethylthiuram disulfide.

captan: [N-Trichloromethylthio-4-cyclohexene-1, 2-dicarboximide].

Daconil 2787: (\*) tetrachloroisophthalonitrile.

Dexon: (\*) p-(dimethylamino) benzenediazo sodium sulfonate.

Dyrene: (\*) 2,4-dichloro-6-(o-chloroanilino)-s-triazine.

Fore: (\*) coordination product of zinc ion and manganous ethylenebis [dithiocarbamate].

Ortho Lawn and Turf Fungicide: (\*) cadmium carbonate 5%, folpet 60%, thiram 10%.

PCNB: pentachloronitrobenzene.

zineb: zinc ethylene bisdithiocarbamate.

<sup>1</sup> \* denotes a trademark or proprietary product.

## GUIDE FOR SELECTING FUNGICIDES

Application Per 1000 Square Feet			
Disease and Casual Organism	Fungicide	Ounces of Active Ingredient or Formulation Per 3 to 10 Gallons of Water <sup>1</sup>	Directions
Leafspot (Blight, Going-out, Melting-out) <i>Helminthosporium</i> Fading-out <i>Curvularia</i>	Acti-dione-thiram*	3 to 4	Disease can appear from April to August, depending on kind of grass and species of fungus. Treat your lawn every 7 to 14 days three times consecutively or until the disease has been controlled.
	Captan	2 to 3	
	Daconil 2787*	3 to 4	
	Dyrene*	2 to 4	
	Fore*	3 to 4	
Brown Patch <i>Rhizoctonia solani</i>	Zineb	1 to 3	Disease can appear from June to August. Treat your lawn every 5 to 10 days until the disease has been controlled.
	Dyrene*	2 to 4	
	Fore*	3 to 4	
	PCNB	2 to 4	
Rust <i>Puccinia</i>	Acti-dione-thiram*	3 to 4	Disease can appear from June to September. Treat your lawn every 7 to 14 days until rust disappears.
	Daconil 2787*	3 to 4	
	Zineb	1 to 3	
Grease Spot and Cottony Blight <i>Pythium</i>	Dexon*	1 to 2	Disease can appear from July to September and in fall and winter during warm, humid periods in the South. Treat your lawn every 5 to 14 days until the disease has been controlled.
	Zineb	1 to 3	
Dollar Spot <i>Sclerotinia homeocarpa</i>	Acti-dione-thiram*	2 to 4	Disease can appear from June to October. Treat your lawn at 7 to 14 day intervals until the disease has been controlled.
	Daconil 2787*	2 to 4	
	Dyrene*	2 to 4	
	Fore*	3 to 5	
	Ortho Lawn and Turf Fungicide*	4	

Snow Mold <i>Typhula</i> Fusarium Patch <i>Fusarium</i>	Dyrene*	2 to 4	Disease can appear from fall to spring. Treat your lawn at intervals of 2 to 6 weeks as needed.
Mushrooms Fairy Rings <i>Marasmius</i> , <i>Psalliota campestris</i> , <i>Lepiota</i>	Captan Methyl Bromide	2 to 3 Follow the manufacturer's directions	Disease can appear throughout the growing season. Pour double or triple strength concentrate of captan into 1-inch holes punched 4 to 6 inches deep and 6 to 8 inches apart both inside and outside the affected area. Alternative method: fumigate infected area with methyl bromide; reseed or resod.
Slime Molds <i>Physarum cinereum</i>	Any garden or turf fungicide	Follow the manufacturer's directions	Disease can appear throughout the growing season and can be controlled without fungicides. See page 9.

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<sup>1</sup> Acti-dione-thiram and Ortho Lawn and Turf Fungicides are formulations of more than one active ingredient. Methyl bromide is applied as a vapor or gas. For all applications, read the manufacturer's directions.

\* See footnote on page 5.



## MANAGEMENT PRACTICES THAT HELP PREVENT LAWN DISEASES

These practices are general guides to be used according to one's judgment. Their importance depends on the kind and seriousness of the disease threat. Not all of them are practicable under all conditions.

- Select grass species best adapted to the soil, climatic, and light conditions under which they will be grown.

- Plant mixtures of recommended grasses. Species vary in their susceptibility to different disease organisms, and in a mixture one or more of the grasses usually will survive a severe disease attack.

- Do not clip upright-growing grasses such as Kentucky bluegrass and red fescue too closely—1¾ to 2 inches is the best height. Creeping grasses such as bentgrass and zoysia may be clipped at ½ inch or less.

- Mow the grass before it gets too tall; not more than one-half of the leaf surface should be removed at one time.

- Mow the lawn frequently enough in the fall to prevent the accumulation of a thick mat of grass before snow comes.

- Apply enough fertilizer to keep grass vigorously growing, but avoid overstimulating the grass with nitrogen. Apply lime if soil tests indicate a need for it.

- Clippings need not be removed except on heavily fertilized lawns or during periods when the grass is growing rapidly. Clippings provide nutrients for fungi and help to maintain humidity long after the sun has dried off surrounding uncovered areas.

- Water early enough in the day to allow grass leaves time to dry out before night. Avoid frequent, light waterings, especially during warm weather.

- Do not water grass until it begins to wilt, then soak the soil to a depth of 6 inches or more. Provide good surface drainage.

For information on lawn care and the control of lawn insects, see Home and Garden Bulletin 51, "Better Lawns," and Home and Garden Bulletin 53, "Lawn Insects: How To Control Them," which you may obtain from your county agricultural agent or from the Office of Information, U.S. Department of Agriculture, Washington, D.C. 20250.

Washington, D.C.

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